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Digital Literacy Skills in Southern Nigerian Tertiary Institutions

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Abstract

This study evaluates digital literacy skills among students in tertiary institutions in the southern geopolitical zone of Nigeria. The research focuses on two universities: the University of Calabar and the University of Port Harcourt, specifically within their Departments of Tourism and Hospitality Management. Data collection was conducted using an electronic questionnaire administered via an online survey platform. The findings indicate that major emerging trends in digital literacy skill requirements among tertiary institution students include improved information retrieval, Artificial Intelligence (AI) and machine learning, data science and analytics, and cybersecurity. The study also revealed that these digital literacy skills significantly impact students' learning outcomes by enhancing information retrieval, expanding access to educational research, increasing collaboration and communication, and facilitating feedback and assessment. Additionally, inquiry-based learning, multimedia presentations, and flipped classroom approaches were identified as the most effective methods for integrating digital literacy skills in tertiary institutions. However, the study also highlighted significant challenges, such as the digital divide, the complexity of digital tools, and limited access to technology. To address these issues, it is essential to provide enhanced digital tools, adequate access to technology, and effective digital literacy training for students in tertiary institutions. Therefore, an effective mechanism is needed to overcome the challenges associated with mastering digital literacy skills among students in tertiary institutions.

Keywords: Emerging Trends, Digital Literacy, Geopolitical Zone, Literacy Skills, Tertiary Institution.

Introduction

Digital literacy has become a fundamental competency in higher education worldwide, reflecting the pervasive role of technology in academia and professional environments. In developed regions such as North America and Europe, students generally have extensive access to the latest technological tools and high-speed internet, enhancing their digital literacy (1, 2). Digital literacy encompasses a range of skills and competencies needed to effectively navigate, evaluate, create, and communicate information in digital environments (3). It includes aspects such as information literacy, media literacy, technological proficiency, critical thinking, and ethical considerations in the use of digital tools (4). Research indicates that individuals with higher levels of digital literacy achieve better academic performance, greater employability, and enhanced civic engagement (5, 6). Furthermore, digital literacy empowers students to critically assess information, participate in online communities, and adapt to rapidly evolving technological landscapes (7). Recent studies highlight a growing emphasis on integrating digital literacy into

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curricula across tertiary institutions globally (8, 9). The ability to critically evaluate and manage information is fundamental to digital literacy. It is emphasized that in the digital era, individuals must not only access information but also critically assess its credibility and relevance (10). This skill has become vital as misinformation and disinformation continue to spread online. It is further argued that critical evaluation skills are essential for navigating the complex digital information landscape (11). As noted, understanding how to effectively navigate and utilize these systems is crucial for professionals in digital marketing, journalism, and other content-driven fields (12). Moreover, there is a strong emphasis on the need for individuals to grasp basic cybersecurity principles to safeguard personal and organizational data (13, 14). A critical analysis of the variables discussed in this study is further empirically supported, indicating that digital literacy skills now include not only basic computer usage but also information literacy, media literacy, and the ability to critically assess digital content (15). Additionally, the incorporation of AI and big data analytics across various sectors necessitates student proficiency in data literacy and algorithmic thinking (16). Research has demonstrated that students with higher levels of digital literacy tend to achieve better academic performance and exhibit enhanced problem-solving abilities (17). Moreover, digital literacy promotes independent learning and critical thinking, equipping students for the complexities of the modern workplace (18). Flipped classrooms, where students interact with digital content outside of traditional class hours and engage in collaborative activities during class, have also been shown to enhance digital literacy skills (19). However, access to technology and digital resources remains a significant obstacle, particularly for students in low-income and rural areas (20). There is also a disparity in the quality of digital education, with some educators lacking adequate training to teach digital skills effectively (21). Additionally, students often face difficulties with the vast amount of digital information available and require guidance in developing critical evaluation skills (22). Although, several researches have been conducted globally (23, 24) and in regional perspective (25, 26) on evaluation of digital literacy skill among students tertiary institutions south-south geopolitical zone in Nigeria but none has highlighted and placed emphases in study area. This research focuses on skills such as communication and technical literacy, with particular emphasis on identifying emerging trends in digital literacy skill requirements and examining the impact of digital literacy skills on students' learning outcomes, teaching methods used to integrate digital literacy skills, and the challenges students face in acquiring and mastering these skills. In the light of the above this research will enhanced literacy digital career among tertiary institution students. Beside, this study will further unveiled the challenges faced by student in acquiring and mastering digital literacy skill and also help to bridge the gap in the existing literature, hence aid further studies. In recent years, the integration of digital technology into tertiary education has been transformative globally, particularly in Europe and Asia. Digital technology has revolutionized the educational landscape of the 21st century, reshaping how knowledge is disseminated and acquired. European nations, in particular, have been leaders in adopting digital technologies in education, spurred by initiatives such as the Digital Education Action Plan by the European Commission, which aims to enhance education and training systems (27). Blended learning approaches have been pivotal in enhancing student engagement and improving learning outcomes across Europe. Research has shown that platforms like Moodle and Blackboard are extensively used for course management and delivery, offering tools for communication, assessment, and resources sharing that facilitate interactive and collaborative learning (28, 29). European tertiary institutions prioritize equipping students with digital skills essential for the modern workforce (12, 30). In the United States and other Western countries, digital literacy has become integral to education, leading to the identification of several emerging trends in digital literacy skill requirements. Tools such as Google Workspace, Microsoft Teams, and other collaborative platforms emphasize effective communication and teamwork in digital environments (31, 32). Additionally, basic coding skills are increasingly recognized for their role in enhancing problem-solving abilities and laying the groundwork for engaging with advanced technological tools (33, 34). Furthermore, digital literacy enables students to access a vast array of

online resources, fostering self-directed learning where they can explore topics of interest at their own pace (35, 36). These skills are cultivated through activities such as coding, data analysis, and critically evaluating digital content (30, 37). Assessments like the International Computer and Information Literacy Study (ICILS) exemplify efforts to gauge students' proficiency in these domains (38). The Test of Digital Literacy, developed by the Educational Testing Service (ETS), provides another means to measure students' abilities in digital literacy (39). Digital literacy has become an essential competency in higher education, particularly in the United States, where technological advancements continuously reshape the educational landscape. In regions like Europe and Asia, various teaching methods are employed to integrate digital literacy skills into tertiary education (40, 41). Project-Based Learning (PBL) is a student-centered pedagogy that involves students working on real-world projects and is extensively used in higher education to foster digital literacy. According to (42), PBL involves complex tasks based on challenging questions or problems, requiring students to engage in design, problem-solving, decision-making, and investigative activities. In West African countries such as Nigeria, Senegal, and Ghana, PBL has been integrated into various educational levels to enhance student engagement and learning outcomes. For instance, the adoption of PBL in science and engineering courses has shown promising results in developing critical thinking and problem-solving skills (43). At the University of Lagos, engineering students participate in projects addressing local community issues, such as developing sustainable energy solutions and improving water sanitation systems. These projects not only provide practical experience but also foster social responsibility (44). This approach has been shown to improve teacher readiness and student learning outcomes (45) and aligns with the country's goal to enhance employability and economic development (46). Similarly, the Ecole Supérieure Polytechnique de Dakar has adopted PBL in its technical courses, where students work on industry-related projects, such as developing software applications or designing mechanical systems. This approach has improved student engagement and technical competency (46). Furthermore, observational studies can uncover practical challenges and identify areas where students may require additional support (47). Peer and instructor evaluations can complement other assessment methods by assessing students' digital literacy skills based on specific criteria. This approach provides valuable feedback and encourages collaborative learning (48, 49). In West Africa, several factors shape attitudes towards digital learning, including access to technology, digital skills, and cultural perceptions (50, 51). There are gaps in students' proficiency in advanced digital skills such as coding, data analysis, and cybersecurity (20, 52). Rigorous standards and quality assurance mechanisms are needed to maintain the effectiveness of online and blended learning programs (27, 53). Moreover, digital technology has the potential to revolutionize education by providing personalized learning experiences and adaptive learning paths tailored to individual student needs (54). Blockchain technology can enhance the security and transparency of academic records, making credential verification more efficient and reliable (55, 56). However, there are challenges such as insufficient funding for technology in education, lack of trained educators, and varying levels of digital infrastructure (57). Additionally, cultural attitudes towards technology and digital learning can influence the effectiveness of digital literacy programs (58). The future of digital technology in tertiary education is promising, with advancements such as AI and machine learning set to further enhance learning experiences. AI can provide personalized learning paths and real-time feedback, catering to individual student needs (54). The perceived benefits and challenges of digital learning significantly influence students' attitudes. Challenges such as technical difficulties, lack of personal interaction, and concerns about the quality of online education can lead to negative attitudes (59). In West Africa, traditional views on education, peer influence, and societal norms can affect students' acceptance and engagement with digital learning. For example, in some communities, face-to-face interaction is highly valued, which can result in resistance to online education (60). Conversely, the lack of support and poor infrastructure can hinder students' acceptance and use of digital learning tools (61). Digital literacy has become a vital skill for students

in tertiary institutions worldwide, and Sub-Saharan Africa is no exception. As the global reliance on digital technologies for communication, education, and work continues to grow, the ability to effectively navigate and utilize these tools is crucial for students' academic success and future career prospects. According to the International Telecommunication Union (62), while mobile phone usage has significantly increased in the region, access to computers and reliable internet remains limited, especially in rural communities. This digital divide hampers students' ability to acquire and develop digital literacy skills, which are essential for engaging with online learning resources, conducting research, and participating in digital communication platforms (63). In urban areas, while students in tertiary institutions may have better access to digital devices and high-speed internet, challenges such as inconsistent electricity supply and high data costs still hinder the effective use of digital tools (64). Additionally, the quality of digital education varies significantly across the region. Many institutions in Sub-Saharan Africa continue to rely on outdated curricula that fail to adequately prepare students for the digital economy. A study (65) revealed that most tertiary institutions in the region still rely on traditional teaching methods and have not fully integrated ICT (Information and Communication Technology) into their courses. As a result, many students possess basic technological skills but lack the advanced knowledge of digital tools and platforms necessary for success in today's academic and professional environments (66). Despite challenges, initiatives to promote digital literacy skills among tertiary students are growing across Sub-Saharan Africa. Governments and educational institutions are increasingly prioritizing digital skills in academic curricula. In Nigeria, the National Information Technology Development Agency (NITDA) has launched programs to improve digital skills among students and professionals (67). Similarly, Kenya's Digital Literacy Programme equips students with ICT skills early in their education (68). The rise of online learning platforms, including MOOCs and online degree programs, has further enhanced digital literacy. Platforms like Coursera, edX, and Alison are widely used by African students to acquire skills such as coding, data analysis, and digital communication (69). These platforms, together with local digital programs offered by NGOs and the private sector, support students without access to formal digital education (70). Digital literacy is vital for academic success and employability. Students proficient in digital tools can better access educational resources, collaborate, and engage in research. Researchers in the past (71) found that students skilled in digital tools achieved higher academic success. Moreover, as digital skills are increasingly valued in the job market, particularly in sectors like banking, healthcare, and agriculture (72), students with digital competencies are more likely to secure employment and succeed in their careers (64). Digital literacy is crucial for academic success and employability in Sub-Saharan Africa, requiring ongoing collaboration to address resource disparities.

Conceptual Framework

ETS's Test of Digital Literacy: The ETS has developed a Test of Digital Literacy to assess individuals' abilities to navigate, evaluate, create, and communicate information in digital environments effectively. Recognized as a critical skill for academic success, professional competence, and informed citizenship (38), digital literacy's importance continues to grow. Development and Components of ETS's Test of Digital Literacy ETS, a leading nonprofit organization in educational measurement and research, created the Test of Digital Literacy to address the growing need for evaluating digital competencies (39). The test covers several domains: technical proficiency, information evaluation, content creation, communication, and ethical considerations in digital contexts. It assesses skills such as searching and evaluating online information, using digital tools, creating digital content, and communicating effectively in digital environments, while also addressing ethical issues like privacy, security, and the responsible use of digital resources (73). The digital literacy skills are essential in today's information-rich society, enabling individuals to critically assess the credibility and relevance of digital content—a vital skill given the proliferation of misinformation online (74). It is emphasized that digital literacy empowers individuals to actively participate in online communities and engage in civic activities (75). Research indicates that higher levels of digital literacy correlate with better academic

performance, increased employability, and enhanced social and civic engagement (5, 21). As digital literacy becomes more integral to success, standardized assessments like the ETS's Test of Digital Literacy provide valuable benchmarks for individuals and institutions.

Framework Operationalization: The ETS's Test of Digital Literacy is used in various educational settings, including secondary schools, colleges, and universities, to assess and improve students' digital competencies. It helps educators identify areas where students need additional support and develop targeted interventions to enhance digital literacy. Institutions also use the test to evaluate the effectiveness of digital literacy programs and curricula, ensuring that educational programs align with the demands of the digital age (39). In the workplace, the test assesses employees' digital literacy skills, helping employers identify training needs and develop professional development programs, particularly in industries where digital competencies are crucial for job performance and innovation (76). Despite its benefits, the ETS's Test of Digital Literacy faces challenges. One criticism is that standardized tests may not fully capture the dynamic and context-dependent nature of digital literacy (11). Digital literacy involves not only technical skills but also critical thinking, creativity, and adaptability, which can be difficult to assess through standardized measures alone. Additionally, there is concern that such tests may reinforce existing inequalities, as students from underprivileged backgrounds may have less access to technology and fewer opportunities to develop digital skills, potentially leading to lower test scores (38). Addressing these disparities requires a holistic approach that includes improving access to technology and providing equitable learning opportunities.

Materials and Methodology

The research employed a survey method that utilizes a mixed-methods research design, combining both quantitative and qualitative approaches. This design was chosen to provide a comprehensive understanding of the variables outlined in the study objectives. The quantitative component involves inferential statistical analyses, while the qualitative component focus on descriptive analyses of the variables specified in the objectives.

Population

The study population consists of two tertiary institutions which include, University of Calabar and University of Port Harcourt within the Southern Geopolitical Zone of Nigeria were used for this study. The Southern Zone's prestigious educational institutions, advanced technological adoption, high internet penetration, and access to digital tools make it an ideal setting for exploring digital literacy trends and their impact on students' learning outcomes.

Data Collection

A reconnaissance survey was conducted at each university to facilitate the effective design of the questionnaire and identify the departments and respondents to be included. Invitations were subsequently sent to selected students via email or distributed through institutional learning management systems. Participation was voluntary and anonymous, with informed consent obtained from all participants. To ensure fair representation, the Department of Tourism and Hospitality Management in the Faculty of Management Science at each university was selected for this study. The questionnaire, used as the data collection instrument, included items such as the identification of emerging trends in digital literacy skill requirements, the impact of digital literacy skills on students' learning outcomes, teaching methods used to integrate digital literacy skills, and the challenges students face in acquiring and mastering these skills.

Sampling Technique

The purposive sampling technique was employed to select the tertiary institutions for the study. Within each institution, a stratified random sampling technique was utilized to select a representative sample of students from various programs and academic levels, ranging from first-year to fourth-year students.

Sample Size: A sample size of 380 respondents was obtained from the institution used for the study.

Hypothesis

One hypothesis was formulated for the study which include

H_0: There is no significant relationship between identification of emerging trends in digital literacy skill requirements and challenges faced by students in acquiring and mastering digital literacy skill

Data Analysis

The Pearson product-moment correlation, however, does not consider whether a variable is classified as dependent or independent; it treats all variables equally. It measures the strength of the linear association between two variables, attempting to draw a line of best fit through the data of both variables.

The Pearson's formula is given as:

$$R = \frac{n\sum xy - \sum x\sum y}{\sqrt{n\sum x^2 - (\sum x)^2}.\ n\sum y^2 - (\sum y)^2} \quad \text{.....[1]}$$

Where: R = correlation coefficient

x = (Digital literacy skill variables).

y = (Challenges of mastering digital literacy skill variables)

Results

The analysis of findings involved examining the results obtained from diverse statistical analyses. Nonetheless, this discussion was founded on the specified hypotheses.

Identification of Emerging Trends in Digital Literacy Skill Requirements

The emerging trends in digital literacy skill requirements, as presented in Table 1, indicate that AI and machine learning 12.5 percent, data science and analytics 10.99 percent and cyber security 10.74 percent are the major trends among students in tertiary institutions. Additionally, Table 1 shows that 8.69 percent and 8.18 percent of respondents recognize augmented reality and virtual reality, as well as block chain, as significant trends in digital literacy skill requirements for tertiary students in the study area. Moreover, Table 1 highlights that cloud computing and robotic automation, each with a value of 7.92 percent, are also important literacy skill requirements among tertiary institution students. Furthermore, ethical and responsible data practices 6.90 percent remote collaboration and digital communication 6.64 percent and digital marketing 6.39 percent are identified as emerging trends in digital literacy requirements among tertiary students in the study area.

Table 1: Identify Emerging Trends in Digital Literacy Skill Requirements among Tertiary Institution Students

S/N	Emerging Trends In Digital Requirements	University of Calabar Frequency of Respondents	Percentage	University of Port Harcourt Frequency of Respondents	Total		Percentage
1	Improved information retrieved AI and mechanical learning	24	12.24	25	12.50	49	12.53
2	Data science and analytics	22	11.22	21	10.71	43	10.99
3	Cyber security	20	10.20	22	11.22	42	10.74
4	Cloud computing	14	7.14	17	8.67	31	7.92
5	Internet of things	11	5.61	10	5.10	21	5.37
6.	Block chain	15	7.65	17	8.67	32	8.18
7	Digital marketing	13	6.63	12	6.12	25	6.39

8	User experiences design	10	5.10	11	5.61	21	5.37
9	Agreement reality and virtual reality	18	9.18	16	8.16	34	8.69
10	Robotic automation	16	8.16	15	7.65	31	7.92
11	Ethical and responsible data practice	15	6.63	14	7.14	27	6.90
13	Remote collaboration and digital communication	14	7.14	12	6.12	26	6.64
	Any other (Specify)	6	3.06	4	2.04	10	2.55
	Total	196	100	196		391	100

Impact of Digital Literacy skill on Students Learning Outcomes: The impact of digital literacy skills on students' learning outcomes, as presented in Table 2, indicates that 11.98 percent of respondents affirm improved information retrieval, and 11.95 percent highlight expanded access to educational resources as significant impacts of digital literacy skills on learning outcomes in the study area. Furthermore, the findings reveal that facilitated feedback and assessment, along with increased collaboration and communication 10.71 percent also significantly impact students' learning outcomes. Additionally, 9.94 percent and 9.43 percent of respondents agree that enhanced critical thinking and enhanced multimodal learning, respectively, are notable impacts of digital literacy skills on students' learning outcomes in the study area.

Table 2: Impact of Digital Literacy skills on Students Learning Outcomes

S/N	**Digital Literacy Skill On Students Learning Outcomes**	**University of Calabar**		**University of Port-Harcourt**			
		Frequency of Respondents	**Percentage**	**Frequency of Respondents**	**Percentage**	**Total**	**Percentage**
1	Improved information retrieval	23	11.73	24	12.24	47	11.98
2	Enhanced critical thinking	19	9.69	20	10.20	39	9.94
3	Increase collaboration and communication	20	10.20	22	11.22	42	10.71
4	Creator creativity and innovation	15	7.65	14	7.14	29	7.39
5	Enhanced multimodal learning	18	9.18	19	9.96	37	9.43
6.	Flexible and adoptive learning	11	5.61	13	6.63	24	6.12
7	Expanded access to educational resources	24	12.24	23	11.73	47	11.98

8	Preparation for future career's	13	6.63	14	7.14	27	6.88
9	Facilitated feedback and assessment	22	11.22	20	10.20	42	10.71
10	Increase engagement and motivation	10	5.10	11	5.61	21	5.35
11	Development of digital citizenship skills	12	6.12	10	5.10	22	5.61
13	Any other (Specify)	9	4.59	6	3.06	15	3.82
	Total	196	100	196	100	392	

Teaching Methods Use to Integrate Digital Literacy Skills: Table 3 illustrates the various teaching methods employed to incorporate digital literacy skills within tertiary institutions. Among the surveyed respondents, 19.64 percent and 15.56 percent acknowledged multimedia presentations and online collaboration projects as primary approaches for integrating these skills. Furthermore, the data reveals that 12.24 percent, 10.45 percent and 7.90 percent of respondents endorsed inquiry-based learning, the flipped classroom model, and PBL, respectively, as effective strategies for fostering digital literacy. Additionally, 4.59 percent and 4.33 percent of participants identified peer learning and mentorship, as well as digital storytelling, as noteworthy methods in this regard.

Table 3: Teaching Methods Use to Integrate Digital Literacy Skills into Tertiary Institution

S/N	Pedagogical Strategic and Teaching Methods	University of Calabar		University of Port Harcourt			
		Frequency of Respondents	Percentage	Frequency of Respondents	Percentage	Total	Percentage
1	Project –based learning	26	13.26	25	12.75	31	7.90
2	Flipped classroom approach	20	10.20	21	10.71	41	10.45
3	inquiry-based learning	23	11.73	25	12.75	48	12.24
4	Multimedia presentation	40	20.40	37	18.87	77	19.64
5	Online collaborative project	30	15.30	31	15.81	61	15.56
6.	Digital storytelling	9	4.59	8	4.08	17	4.33
7	Simulations and virtual labs	12	6.12	11	5.61	23	5.86
8	Gamification	10	5.10	13	6.63	23	5.86
9	Peer learning and mentorship	8	4.08	10	5.10	18	4.59
10	Just-in-time learning	4	2.04	3	1.53	7	1.78

11	Reflection and metacaguition	6	3.06	5	2.55	11	2.80
12	Problem – based learning	5	2.55	5	2.55	10	2.55
13	Any other (Specify)	3	1.53	2	1.02	5	1.27
	Total	196	100	196	100	392	

Challenges Faced by Students in Acquiring and Mastering Digital Literacy Skills: The challenges faced by students in acquiring and mastering digital literacy skills presented in Table 4 indicate that complexity of digital tools, digital divide and access to technology with values 16.32 percent, 12.50 percent and 10.96 percent were the major challenges faced by students in acquiring and mastering digital literacy skill. Furthermore, Table 4 further reveal that 10.71 percent, 9.43 percent and 8.67 percent of the sampled respondents agreed that technological infrastructure, lack of digital literacy training and digital literacy gaps were also challenges faced by students in acquiring and mastering digital literacy skill. The study also shows that accessibility barriers with values with a value 6.57 percent, information overload with a value 6.12 percent and digital distraction also constitute challenges faced by students in acquiring and mastering digital literacy skills in the study area.

Table 4: Challenges Faced by Students in Acquiring and Mastering Digital Literacy Skills

S/N	**Challenges Faced by Students**	**University of Calabar**		**University of Port Harcourt**			
		Frequency of Respondents	**Percentage**	**Frequency of Respondents**	**Percentage**	**Total**	**Percentage**
1	Access to technology	21	10.71	22	11.22	43	10.96
2	Technological infrastructure	22	11.22	20	10.20	42	1.71
3	Digital divide	25	12.75	24	12.24	49	12.50
4	Digital literacy gaps	15	7.65	19	9.96	34	8.67
5	Complexity of digital tools	36	18.36	28	14.28	64	16.32
6.	Information overload	11	5.61	13	6.63	24	6.12
7	Digital distraction	10	5.10	11	5.61	21	5.35
8	Lack of digital literacy training	19	9.69	18	9.18	37	9.43
9	Resistance to change	6	3.06	8	4.08	14	3.57
10	Accessibility barriers	12	6.12	13	6.63	25	6.37
11	Digital anxiety	9	4.59	10	5.10	19	4.84
12	Digital secrete and privacy concerns	8	4.08	7	3.57	15	3.82
13	Any other (Specify)	2	1.02	3	1.53	5	1.27
	Total	196	10	196	100	392	

However, the results from the tested hypothesis, which investigated the relationship between the identification of emerging trends in digital literacy skill requirements and the challenges faced by students in acquiring and mastering these skills, are presented in Table 5. The analysis was conducted using data from Table 1 and 4, showing a positive correlation between the two variables. The Product Moment Correlation revealed that the score for the identification of emerging trends in digital literacy skill requirements was 43.19 with a standard deviation of 32.226. Meanwhile, the mean score for the challenges faced by students in the study area was 42.28 with a standard deviation of 17.462. Table 5 further illustrates that the correlation coefficient between these two variables is 0.180, with an associated value of 0.675. This indicates a positive correlation between the identification of emerging trends in digital literacy skill requirements and the challenges faced by students in acquiring and mastering digital literacy skills in the study area. Therefore, these results indicate a significant relationship between the identification of emerging trends in digital literacy skill requirements and the challenges faced by students in acquiring and mastering these skills. As a result, the null hypothesis is rejected, and the alternative hypothesis is accepted.

Table 5: Result Showing Correlation between Identification of Emerging Trends in Digital Literacy Skill Requirements and Challenges Faced by Students in Acquiring and Mastering Digital Literacy Skill

		Identified Emerging Digital Literacy Skill	**Challenges faced by Students**
Identified emerging digital literacy skill	Pearson Correlation	1	.180
	Sig.(2-tailled)		
	N	11	.675
Challenges faced by students	Pearson Correlation	0 .180	11
			1
	Sig. (2-tailed)	0 .675	
	N	11	11

Discussion

This research evaluates digital literacy skills among students in tertiary institutions in the southern geopolitical zone of Nigeria. The study identified several emerging trends in digital literacy skills among tertiary students in the region. Key skills observed include improved information retrieval, AI, machine learning, data science and analytics, and cybersecurity. These findings are consistent with previous research that also identified trends such as cloud computing, the Internet of Things, data science, and analytics as essential digital literacy skills for tertiary students (27, 38, 39). The study further indicates that digital literacy skills significantly enhance students' learning outcomes by improving information retrieval, boosting collaboration and communication, and fostering critical thinking. These effects align with the analyses of others, who emphasized that broader access to educational research, along with facilitated feedback and assessment, positively influences students' learning outcomes (12, 30). This finding is supported by similar observations from (33, 34, 43). Moreover, the research highlights the effectiveness of inquiry-based learning, multimedia presentations, and online collaboration projects as teaching methods for integrating digital literacy skills into tertiary education. This observation aligns with the works of others and is further supported by those who affirmed the use of various teaching methods in institutions (40, 41; 43, 44).However, the study also identifies significant challenges faced by students in acquiring and mastering digital literacy skills, such as the digital divide, the complexity of digital tools, and limited access to technology. These challenges are supported by others who identified similar obstacles in their analyses (20, 45, 50, 52, 58). To address these challenges, enhanced digital tools, better access to technology, and effective digital literacy training are essential for students in tertiary institutions. The Southern Geopolitical Zone of Nigeria, comprising the South West, South South, and South East regions, is characterized by a diverse blend of socio-

economic, cultural, and technological factors that significantly influence the development of digital literacy skills (77). A key factor affecting digital literacy in this region is its socio-economic landscape. Urban areas in the Southern Zone benefit from widespread access to the internet, mobile phones, and computers, which play a crucial role in fostering higher levels of digital literacy (77). In contrast, rural areas in the South South and South East regions face significant infrastructural challenges, such as inconsistent power supply, poor internet connectivity, and limited access to digital devices, which restrict opportunities for acquiring digital skills (78). The educational system in the Southern Zone also plays a key role in shaping digital literacy levels. In states such as Lagos, Ogun, and Rivers, educational policies and programs have increasingly integrated ICT into the curriculum. For example, Lagos State launched the Eko project, which aims to provide digital learning opportunities for primary and secondary school students. The project includes initiatives like computer-based exams and digital learning resources, thereby enhancing students' digital literacy (79). However, there remains a disparity between urban and rural schools in terms of resources, with many rural schools lacking access to computers, reliable internet, and trained ICT instructors (80). This digital divide, particularly in the South and South East, results in gaps in digital literacy between urban and rural populations. In addition to formal education, mobile phone penetration in the Southern Zone has contributed significantly to the development of digital literacy skills. According to the Nigerian Communications Commission (67), mobile phone usage in this region is widespread, providing individuals with access to digital content, educational materials, and online training programs. Mobile technology has particularly helped bridge the digital education gap, offering opportunities for informal learning, especially in rural areas. Apps, SMS services, and mobile-friendly websites are increasingly used for digital literacy programs aimed at adults, especially women and marginalized groups (77). Cultural attitudes toward digital technology also influence digital literacy in the Southern Zone. In the South West, especially in Lagos, there is a strong cultural focus on technology adoption, evident in the region's thriving tech ecosystem and the growing number of start-ups (80).

Conclusion

In recent times, digital literacy skills have emerged as essential for enhancing digital learning in tertiary institutions. The findings of this research reveal both the strengths and weaknesses of digital literacy skills among students in tertiary institutions in the southern geopolitical zone of Nigeria. Additionally, the study identifies emerging trends in digital literacy skill requirements for these students. The research also demonstrates that digital literacy skills significantly impact students' learning outcomes in tertiary institutions. Furthermore, it was observed that various teaching methods are employed to integrate digital literacy skills within these institutions. The study also highlights several challenges that students face in mastering digital literacy skills, indicating the need for better integration of digital technology to support students in these institutions.

Abbreviations

ICILS: International Computer and Information Literacy Study, ETS: Educational Testing Service, PBL: Project-Based Learning, AI: Artificial Intelligence.

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Eja, Eja lwara; Mbaze-Ebock Vivian Arrey; Ofem Wokasor Eni; Lilian Anwulika Okoro and Tangban, Egba Ebagu designed and conceptualized the study. Ukwetang John Okpa; Theresa Azin Mbu; Udeme Akaninyene Umo; Maria Enemeba Ngwu; Nnana Okoi Ofem; and Anastecia William Osang conducted the study and collected data. Dan, Felicia Agbor-Obun; Eja, Eja lwara; Grace Michael Inah; Edem Ebong and Uquetan Uquetan Ibor analyzed the results and drafted the manuscript. All authors critically reviewed the manuscript.

Conflict of Interest

The authors have no conflicts of interest to declare.

Ethics Approval

Consent was obtained from all survey participants, and no respondents under the age of 18 were included.

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